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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/755,541	01/12/2004	John B. Heywood	0492611-0534	1354
24280	7590	02/24/2006		
CHOATE, HALL & STEWART LLP			EXAMINER	
TWO INTERNATIONAL PLACE			HARRIS, KATRINA B	
BOSTON, MA 02110				
			ART UNIT	PAPER NUMBER
			3747	

DATE MAILED: 02/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/755,541	HEYWOOD ET AL.
	<b>Examiner</b> Katrina B. Harris	<b>Art Unit</b> 3747

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 03 October 2005.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-9, 12 and 17-25 is/are rejected.
- 7) Claim(s) 10, 11, 13-16, 26 and 27 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 12 January 2004 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                                               |                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                                          | Paper No(s)/Mail Date. _____.                                               |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>01/11/06</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|                                                                                                                                               | 6) <input type="checkbox"/> Other: _____.                                   |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1-9 and 12** are rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi (EP 1378644). Kobayashi discloses as in **claim 1**, High compression ratio, homogeneous charge compression ignition/spark ignition dual mode engine comprising: a first mode employing homogeneous charge compression ignition at low and mid-load levels; and a second mode employing spark ignition at high load levels, the second mode including the addition of hydrogen or a hydrogen/carbon monoxide mixture in the engine.

Regarding **claim 2**, wherein the compression ratio is greater than about 10:1.

Regarding **claim 3**, operating on a low octane gasoline.

Regarding **claim 4**, wherein the addition of hydrogen or a hydrogen/carbon monoxide mixture is sufficient to prevent knock.

Regarding **claim 5**, wherein the addition of hydrogen or a hydrogen/carbon monoxide mixture increases the fuel octane number by at least 10.

Regarding **claim 6**, including control means for changing engine mode.

Regarding **claim 7**, wherein the engine operates on a very lean fuel-air mixture or at a stoichiometric fuel-air mixture with high EGR.

Regarding **claim 8**, including pressure boosting to increase engine power density.

Regarding **claim 9**, wherein pressure boosting is by turbo charging or supercharging.

Regarding **claim 12**, wherein the hydrogen is stored in a high pressure vessel (170) or other onboard storage means.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 17-21, 24 and 25** are rejected under 35 U.S.C. 102(e) as being anticipated by Bromberg et al. (6,981,472). As in **claim 17**, Bromberg et al. discloses a high compression ratio, homogenous charge compression ignition engine operating on a high cetane fuel along with the addition of hydrogen or a hydrogen/carbon monoxide mixture at low-to-mid-load levels.

Regarding **claim 18**, wherein the high cetane fuel is diesel fuel.

Regarding **claim 19**, wherein the ration of hydrogen or a hydrogen/carbon monoxide mixture to the high cetane fuel is reduced at high load levels and the engine operates in compression ignition mode.

Regarding **claim 20**, wherein the ratio of hydrogen or a hydrogen/carbon monoxide mixture to the high cetane fuel is varied to achieve a selected ignition delay.

Regarding **claim 21**, including control means for changing engine mode.

Regarding **claim 24**, wherein hydrogen or hydrogen/carbon monoxide mixture is produced by a hydrocarbon fuel reformer (30).

Regarding **claim 25**, wherein the fuel reformer is a plasmatron.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 22 and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bromberg et al. (6,981,472) in view of Kobayashi (EP 1378644).

Bromberg et al. discloses, as in **claims 22 and 23**, the claimed invention except the use of a supercharger. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Bromberg et al. to include the supercharger of Kobayashi to increase power.

***Allowable Subject Matter***

Claims 10, 11, 13-16, 26 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

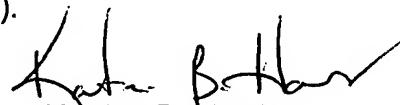
Applicant's arguments with respect to claims 17-27 have been considered but are moot in view of the new ground(s) of rejection.

***Communication***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katrina B. Harris whose telephone number is 571-272-4842. The examiner can normally be reached on 6:30 AM -3:00 PM.

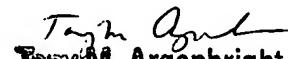
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Yuen can be reached on 571-272-4856. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Katrina B. Harris  
Examiner  
Art Unit 3747

KBH



Tony M. Argenbright  
Primary Examiner  
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